Pinellas STAR Center

Interim Remedial Action Quarterly Progress Report for April through June 2001

4.5 Acre Site

July 2001

Prepared by
U.S. Department of Energy
Grand Junction Office
Grand Junction, Colorado

Project Number PIN−041−0010−02−000
Document Number N0044700

Work Performed Under DOE Contract Number DE−AC13−96GJ87335
Task Order Number MAC01−10

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Acronyms and Abbreviations

BTEX	benzene, toluene, ethylbenzene, and xylene
°C	degrees Celsius
Center	Pinellas STAR Center
CFU	colony forming units
ComQAP	Comprehensive Quality Assurance Plan
DCE	dichloroethene
DOE	U.S. Department of Energy
DPE	dual-phase extraction
DPT	direct push technology
EPA	U.S. Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
ft	feet
ft/ft	feet per foot
HPC	Heterotrophic Plate Count
HSWA	Hazardous and Solid Waste Amendment
HW	horizontal well
IRA	Interim Remedial Action
IRAPA	Interim Remedial Action Plan Addendum
MACTEC–ERS	MACTEC Environmental Restoration Services, LLC
MCL	maximum contaminant level
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
mg/L	milligrams per liter
mV	millivolts
NGVD	national geodetic vertical datum
NTU	Nephelomeric Turbidity Units
PCIC	Pinellas County Industrial Council
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
STAR	Science, Technology, and Research
STL	Severn Trent Laboratories
TCE	trichloroethene
TVOCs	total volatile organic compounds
VOCs	volatile organic compounds

1.0 Introduction

The Pinellas Science, Technology, and Research (STAR) Center is a former U.S. Department of Energy (DOE) facility constructed in the mid-1950s in Pinellas County, Florida. The STAR Center, while owned by DOE, primarily manufactured neutron generators for nuclear weapons. Other products manufactured at the STAR Center have included radioisotopically-powered thermoelectric generators, thermal batteries, specialty capacitors, crystal resonators, neutron detectors, lightning arrestor connectors, and vacuum switch tubes. In 1987, the U.S. Environmental Protection Agency (EPA) performed a Resource Conservation and Recovery Act (RCRA) Facility Assessment at the site to gather information on potential releases of hazardous materials. In February of 1990, EPA issued a Hazardous and Solid Waste Amendment (HSWA) Permit to DOE, enabling DOE to investigate and perform remediation activities in those areas contaminated by hazardous materials resulting from DOE operations. In November 2000, the State of Florida received HSWA authorization from the EPA. On March 17, 1995, DOE sold the facility to the Pinellas County Industrial Council (PCIC). The sales contract includes clauses to ensure continued compliance with Federal, State, and local regulations while DOE remediates the site. On July 1, 1999, the PCIC was disestablished and ownership of the STAR Center changed to the Pinellas County government.

Administration of DOE activities at the facility is the responsibility of the DOE Idaho Operations Office. Responsibility for environmental restoration activities, conducted under the EPA RCRA Corrective Action Program, HSWA Amendments of 1984, was transferred from DOE's Pinellas Area Office to DOE's Grand Junction Office in October 1997. MACTEC Environmental Restoration Services, LLC (MACTEC–ERS), a prime contractor to DOE's Grand Junction Office, provides technical support to DOE for remediation and closure of all active solid-waste management units on site and for the 4.5 Acre Site.

The STAR Center is a 99-acre facility located in Largo, Florida, and lies in the northeast quarter of Section 13, Township 30 South, Range 15 East (Figure 1). The 4.5 Acre Site is located in the northwest portion of the STAR Center (Figure 2). This parcel was owned by DOE from 1957 to 1972, at which time it was sold to a private landowner. During the period of DOE ownership, the property was used for disposal of drums of waste resins and solvents. As a result of this practice, the surficial aquifer was impacted by volatile organic compounds (VOCs), primarily vinyl chloride, toluene, trichloroethene (TCE), and 1,2-dichloroethene (DCE). DOE completed a source removal in 1985. An Interim Remedial Action (IRA) consisting of groundwater extraction and treatment via air stripping, and a routine groundwater monitoring program were initiated in May 1990. In July 1997, a modification involving installation of dual-phase extraction (DPE) wells provided a more aggressive system to remove groundwater contamination. In November 1999, the DPE/air-stripping system was replaced with an in-situ biosparge treatment system. All activities associated with this site are conducted consistent with the Florida Department of Environmental Protection (FDEP) Corrective Actions for Contamination Site Cases and the "Remediation Agreement for the Four and One-Half Acre Site in Largo, Pinellas County, Florida, between: State of Florida Department Environmental Protection and U.S. Department of Energy."

This document is the quarterly progress report for the 4.5 Acre Site for April through June 2001, as requested by the FDEP. The results of monitoring activities, an assessment of plume movement, a summary of the IRA treatment system performance, and a summary of ongoing and projected work are provided in this report. This report represents the annual sampling event for

the 4.5 Acre Site and includes an expanded data visualization section that includes time versus concentration plots and pie charts for selected analytes and monitoring wells and contaminant plume maps for selected analytes.

1.1 Site Update

Problems were encountered with horizontal wells (HW) HW02 and HW03 upon start-up after the July 2000 quarterly sampling event. Both blower systems became inoperative and remained inoperative until completion of equipment modifications and subsequent start-up in January 2001.

An evaluation of the mechanical and overall remediation process of biosparging was undertaken and culminated in two reports, *Review of Horizontal Bisoparge Well and Blower Equipment* (Harding ESE 2000b) and *Review of Biosparge Process as a Treatment Technology* (Harding ESE 2000a). From these two reports, recommendations were provided to change out the blowers and install in-line flow meters. Further details of biosparge system operations during this quarter can be found in Section 3.0 of this report.

Based upon the *4.5 Acre Site Biosparge Monitoring Report* (DOE 2000a), several modifications to the biosparge system were recommended, including DPE well decommissioning and selected monitoring well closure to eliminate observed short-circuiting airflow, which minimizes treatment efficiency. Closing the monitoring wells necessitated development of a revised plan for continued post-closure monitoring. Decommissioning the DPE wells involved the development of a plan to intercept the groundwater contaminant plume in the event that migration off site becomes a concern. The *4.5 Acre Site Biosparge System Integration Plan* (DOE 2000b) was prepared to address these issues.

The *4.5 Acre Site Biosparge System Integration Plan* (DOE 2000b) was approved by FDEP on January 17, 2001. Implementation of the tasks described in this plan was partially completed with the April 2001 abandonment of 22 extraction wells and 16 monitoring wells and the June 2001 installation of two new monitoring wells. Additionally, performance monitoring of the remedial system through the use of direct push technology (DPT) was also undertaken. Samples of groundwater were collected from 29 locations to depths up to 30 feet (ft) and were analyzed for volatile organics and iron. Additionally, microbiological analyses were performed on 10 samples. Section 4.0 provides results from analysis of samples that were collected as part of these activities. Table 1 shows wells that were abandoned as part of the Integration Plan. In June, two new monitoring wells were also installed as part of the Integration Plan. Table 2 provides construction information for these new wells. Additional modifications have been made to the biosparge treatment systems and are discussed in more detail in Section 3.0. Table 3 shows DPT sampling locations and depths.

1.2 Quarterly Site Activities

- Obtained water-level measurements from all monitoring wells on April 2, 2001.
- Conducted the annual sampling event (i.e., collected 88 water samples from selected monitoring wells and DPT sample locations) in April 2001 for analyses of VOCs.
- Reported the results of quarterly sampling events (this document).

- Prepared plume maps, concentration with time trends and pie charts of selected wells, and provided additional data interpretation for sitewide groundwater activities.

- Performed preventive maintenance on the biosparge systems throughout the quarter.

- Connected each biosparge system to STAR Center's compressed air supply system.

2.0 Monitoring Data

2.1 Groundwater Elevations and Flow

Within a 4-hour period commencing on April 2, 2001, depth-to-water measurements were taken in all monitoring wells at the 4.5 Acre Site as part of the sitewide quarterly sampling event. The former DPE wells, which were abandoned later in April, were not measured because the casings were capped to prevent preferential discharge of air injected in the ground by the biosparge treatment system. The depth-to-water in each well was measured with an electronic water-level indicator from the marked location on the top of the well casing, or from the north side if no mark existed. The April 2001 groundwater elevation data for the 4.5 Acre Site are listed in Table 4. The data and information included in Table 4 were used to construct contours of water levels in the deep surficial aquifer in Figure 3.

The water levels were measured 6 days following shutdown of the biosparging system on March 27, 2001. Thus, the flow patterns shown on Figure 3 represent flow conditions that were static or near static following sustained air injection into the ground from the three horizontal wells.

The water table was typically 2 to 4 ft below land surface, with groundwater elevations that ranged from a high of 16.41 ft at PIN20–TE01 to a low of 12.58 ft at PIN20–M023. As shown on Figure 3, groundwater flowed toward the northwest in the south part of the site, and toward the north in the north part of the site. The hydraulic gradient at the site was approximately 0.005 feet per foot (ft/ft). These flow patterns and gradient are similar to those observed in previous quarters. Using Darcy's Law, along with approximations of 1 ft/day for hydraulic conductivity and 0.3 for effective porosity, groundwater at the site is estimated to move about 6 ft/year under static to near-static conditions.

2.2 Groundwater Sampling

Forty monitoring wells and 29 DPT locations were sampled by MACTEC–ERS personnel in April 2001. All DPT locations were sampled at approximately 26 to 30 ft below surface. A selected subset of 19 DPT locations was also sampled at approximately 18 to 22 ft below surface. All DPT locations were grouted after sampling. The sample start depth (feet below surface) is used as part of the identifier for the DPT wells. All samples were submitted to Severn Trent Services Laboratories (STL), and analyzed under their FDEP-approved *Comprehensive Quality Assurance Plan* (ComQAP) (FDEP No. 890142G) for VOCs, using EPA Method 8021.

All samples were collected in accordance with the MACTEC–ERS ComQAP (FDEP No. 970141–3), which is on file with the FDEP. The majority of monitoring wells were purged

with a dedicated bladder pump, although a few were purged with peristaltic pumps. Wells with bladder pumps were micropurged and the sample was collected when the field measurements stabilized. Wells with peristaltic pumps were conventionally purged, purging was considered complete when five well volumes were purged, and one set of field measurements was taken. DPT wells were purged using a peristaltic pump and sampled when the field measurements stabilized. Table 5 and Table 6 list measurements of pH, specific conductance, dissolved oxygen, oxidation-reduction potential, turbidity, and temperature recorded at the time the sample was collected. These measurements were collected using a flow cell and multiparameter meter. Values for total iron and reduced iron were measured at the DPT locations using a colorimeter and are discussed in Section 4.3.

2.3 Groundwater Analytical Results

Total VOCs (TVOCs) and benzene, toluene, ethylbenzene, and xylene (BTEX) concentrations in samples collected from wells at the 4.5 Acre Site are included in Table 7 through Table 10. Table 11 and Table 12 show results for additional VOCs detected. Figure 4 shows the TVOCs concentrations, including the BTEX compounds.

No VOCs were detected in samples from the 50 monitoring wells and DPT sample locations listed below.

PIN20–0502	PIN20–DP18 18 ft	PIN20–M004	PIN20–M028
PIN20–0503	PIN20–DP18 26 ft	PIN20–M005	PIN20–M035
PIN20–DP03 18 ft	PIN20–DP19 26 ft	PIN20–M006	PIN20–M051
PIN20–DP04 26 ft	PIN20–DP20 18 ft	PIN20–M007	PIN20–M22D
PIN20–DP09 26 ft	PIN20–DP23 26 ft	PIN20–M011	PIN20–M38D
PIN20–DP10 26 ft	PIN20–DP24 18 ft	PIN20–M012	PIN20–M40D
PIN20–DP13 18 ft	PIN20–DP24 26 ft	PIN20–M015	PIN20–M40S
PIN20–DP13 26 ft	PIN20–DP26 26 ft	PIN20–M019	PIN20–M41D
PIN20–DP14 26 ft	PIN20–DP28 18 ft	PIN20–M021	PIN20–TE01
PIN20–DP15 26 ft	PIN20–DP28 26 ft	PIN20–M022	PIN20–TE04
PIN20–DP16 23.5 ft	PIN20–DP29 18 ft	PIN20–M023	PIN20–TE05
PIN20–DP17 18 ft	PIN20–DP29 26 ft	PIN20–M024	
PIN20–DP17 26 ft	PIN20–M003	PIN20–M025	

Samples from the 38 monitoring wells and DPT sample locations listed below contained VOCs at detectable levels.

PIN20–DP01 18 ft	PIN20–DP08 18 ft	PIN20–DP21 26 ft	PIN20–M018
PIN20–DP01 26 ft	PIN20–DP08 26 ft	PIN20–DP22 26 ft	PIN20–M036
PIN20–DP02 18 ft	PIN20–DP11 18 ft	PIN20–DP25 18 ft	PIN20–M044
PIN20–DP02 26 ft	PIN20–DP11 25 ft	PIN20–DP25 26 ft	PIN20–M048
PIN20–DP03 26 ft	PIN20–DP12 18 ft	PIN20–DP27 26 ft	PIN20–M049
PIN20–DP05 24 ft	PIN20–DP12 26 ft	PIN20–M001	PIN20–M050
PIN20–DP06 18 ft	PIN20–DP14 18 ft	PIN20–M002	PIN20–M052
PIN20–DP06 26 ft	PIN20–DP15 18 ft	PIN20–M009	PIN20–M18D
PIN20–DP07 18 ft	PIN20–DP20 26 ft	PIN20–M013	
PIN20–DP07 24.5 ft	PIN20–DP21 18 ft	PIN20–M017	

Detected TVOCs values ranged from 1.1 micrograms per liter (µg/L) in well PIN20–M018 to 21,130 µg/L in PIN20–DP02 26 ft. The compound detected at the highest concentration in PIN20–DP02 26 ft was cis-1,2-DCE at a concentration of 13,000 µg/L.

Laboratory reports for quarterly samples collected in April 2001 are provided in Appendix A.

2.4 Quality Assurance/Quality Control

Results of VOCs analysis were compared to the corresponding results from the wells that were sampled in duplicate, and the relative percent differences (RPDs) between the results were calculated. Results of VOCs analysis for each duplicate sample are listed in Table A–1 in Appendix A. All sample/duplicate pairs had an RPD of less than 30 percent when the concentration was greater than 5 times the detection limit. All data are considered Class A level, indicating that the data may be appropriately used for quantitative and qualitative purposes.

According to FDEP guidelines, duplicate samples should be collected at a frequency of 10 percent. There were 40 PIN20 groundwater samples collected from standard monitoring wells and four duplicate samples. For the DPT locations, there were 48 samples collected and five duplicate samples. The goal of 10 percent frequency for duplicates was met. Nine trip blanks were submitted for analysis. Estimated quantities of several compounds were observed that were above the instrument detection limit but below the reporting limit. Of these, methylene chloride was seen in all but one sample. The highest methylene chloride value seen was 0.99 µg/L. Estimated levels of ethylbenzene, xylene, 1,1,2,2-tetrachloroethane, and chloromethane were present in one trip blank. The laboratory was informed of this problem, which was also observed in trip blank results from sitewide sampling. An equipment blank collected during DPT sampling had 1.8 µg/L chloroform. Three equipment blanks collected during routine sampling detected no constituents, although all showed the same estimated levels of methylene chloride seen in the trip blanks.

3.0 Biosparge System Operation

3.1 Biosparge System Performance

The biosparge systems at the 4.5 Acre Site were operational two of the three months in the period April 1 through June 30, 2001. After completion of quarterly sampling, well abandonment, and DPT sampling, biosparge system 1 was restarted on April 30, 2001. Biosparge systems 2 and 3 were restarted on May 1, 2001. After start-up, the biosparge systems ran continuously through the end of June. Modifications performed during the previous quarter, although temporary in nature, appear to have been successful at reducing blower shaft failures. Based on this, final blower drive modifications will be performed during shutdown for the upcoming quarterly sampling in early July. Additionally, a compressed air supply has been installed to each biosparge system; it will be utilized to reduce the load on the biosparge blowers during start-up. The first use of the assistance of compressed air during start-up took place in late June and worked very well.

3.2 Biosparge System Sampling and Monitoring

As described in the previous quarterly report, the Interim Remedial Action Plan Addendum (IRAPA) for the 4.5 Acre Site outlined sampling and monitoring activities to monitor biosparging activities. The *4.5 Acre Site Biosparge Monitoring Report* (DOE 2000a), presents the data collection activities associated with the biosparging system start-up, analyzes the monitoring results, and makes recommendations for continued operations. This report was issued in July 2000. Subsequently, biosparging activities will be monitored on a quarterly basis during regular quarterly sampling events.

4.0 Data Visualization

Several concentration with time plots were created and evaluated to assess whether a trend, if any, was evident regarding the contaminants of concern for the 4.5 Acre Site. This overall data set was evaluated and selected wells and contaminants of concern were chosen for presentation as either concentration with time plots or pie charts. Sampling frequency and detection limits present challenges in identifying and assessing trends. Some wells are sampled four times per year, some twice per year, and some only once per year. Over time, changes in reporting limits, instrument detection limits, and variable samples have been diluted at varying concentrations, all of which tend to mask or mute trends. The data visualization is shown in Figures 5 through 11.

4.1 Contaminant Concentration Trends

Monitoring well PIN20–M013 was chosen to depict historic plume movement. Well –M013 lies along the northern portion of the plume as shown in Figure 8. The concentration with time graphs for cis-1,2-DCE, TCE, and vinyl chloride for well –M013 are depicted in Figure 5 and as pie charts in Figure 6. As can be seen, these compounds were not detected at this location for approximately 2 years. Beginning in October 2000, these compounds started to appear, and have been detected in increasing concentrations in subsequent sampling events. This suggests that a plume of dissolved contaminants may be moving in a northerly direction.

This well was abandoned in May 2001. Potential plume migration will be tracked in this area by the installation of additional DPT sampling points near this location. The first of these sampling events is scheduled for July 2001. As DPT data are collected and analyzed on a quarterly basis, additional DPT locations will be added if needed to further monitor plume movement.

Pie charts for locations PIN20–M048, –M049, and –M050 are shown in Figure 7.

4.2 Plume Maps

Plume maps for the 4.5-Acre Site have been generated for TVOCs (Figure 8), vinyl chloride (Figure 9), cis-1,2-DCE (Figure 10), and TCE (Figure 11). The inferred TVOCs plume boundary (i.e., the dashed contours line) includes all detected concentrations of all analytes. The inferred plume boundaries for the individual compounds are the respective maximum contaminant levels (MCLs) of the compounds. Concentrations that are below the MCL are not included in the plume.

4.3 Geochemical Parameters

Geochemical parameters measured in all wells at the 4.5 Acre Site during the last four quarters of sampling (July 2000 to April 2001) are summarized in Table 13. These parameters show wide variability for several reasons, including the "off and on" nature of biosparging operations over the time period and the fact that some wells are in uncontaminated areas while other wells are in the plume areas.

Water samples for analysis via the Heterotrophic Plate Count (HPC) method were collected from 10 locations during the DPT sampling in April 2001 and are shown on Table 14. HPC measures the number of aerobic bacteria present in the sample. The number of colony forming units (CFU) measured in these samples is relatively low. This indicates that conditions were generally anaerobic at the time the samples were collected. This was expected because the biosparging system had been shut down for approximately 1 month prior to this sampling event.

The purpose of measuring aerobic bacteria is to monitor the conversion from anaerobic to aerobic conditions during biosparging. This data set was intended to serve as the baseline during anaerobic conditions. Once the biosparging system begins continuous operation, the abundance of aerobic organisms should increase due to the oxygen that is injected into the subsurface.

Samples for field analysis of dissolved iron were also collected during the DPT sampling in April 2001. Collection of these data is intended to monitor conversion from reducing to oxidizing conditions during biosparging. This sampling event serves as the baseline because the biosparging system had been shut down for approximately 1 month prior to this sampling event. As can be seen in Table 15, most of the iron was in the reduced (ferrous) form, indicating that conditions were reducing. Once the biosparging system begins continuous operation, the reduced iron should begin to convert to oxidized iron.

5.0 Tasks to be Performed Next Quarter

The following tasks are scheduled during the next quarterly period (July through September 2001).

- Sampling and analysis of groundwater and water level measurements in early July.
- DPT sampling of groundwater.
- Routine preventive maintenance activities.
- Final modifications to the blower drive systems.
- Completion of vegetation removal activities to control the growth of undergrowth and brush around the site.

6.0 References

Harding Lawson Associates (Harding ESE), 2000a. *Review of Biosparge Process as a Treatment Technology*, prepared for MACTEC–ERS, U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, November.

———, 2000b. *Review of Horizontal Biosparge Well and Blower Equipment*, prepared for MACTEC–ERS, U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado, November.

U.S. Department of Energy, 2000a. *4.5 Acre Site Biosparge Monitoring Report*, MAC–PIN 25.5.1, prepared by U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado, July.

———, 2000b. *4.5 Acre Site Biosparge System Integration Plan*, GJO–2000–182–TAR, MAC–PIN 25.5.1.1, prepared by U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado, December.

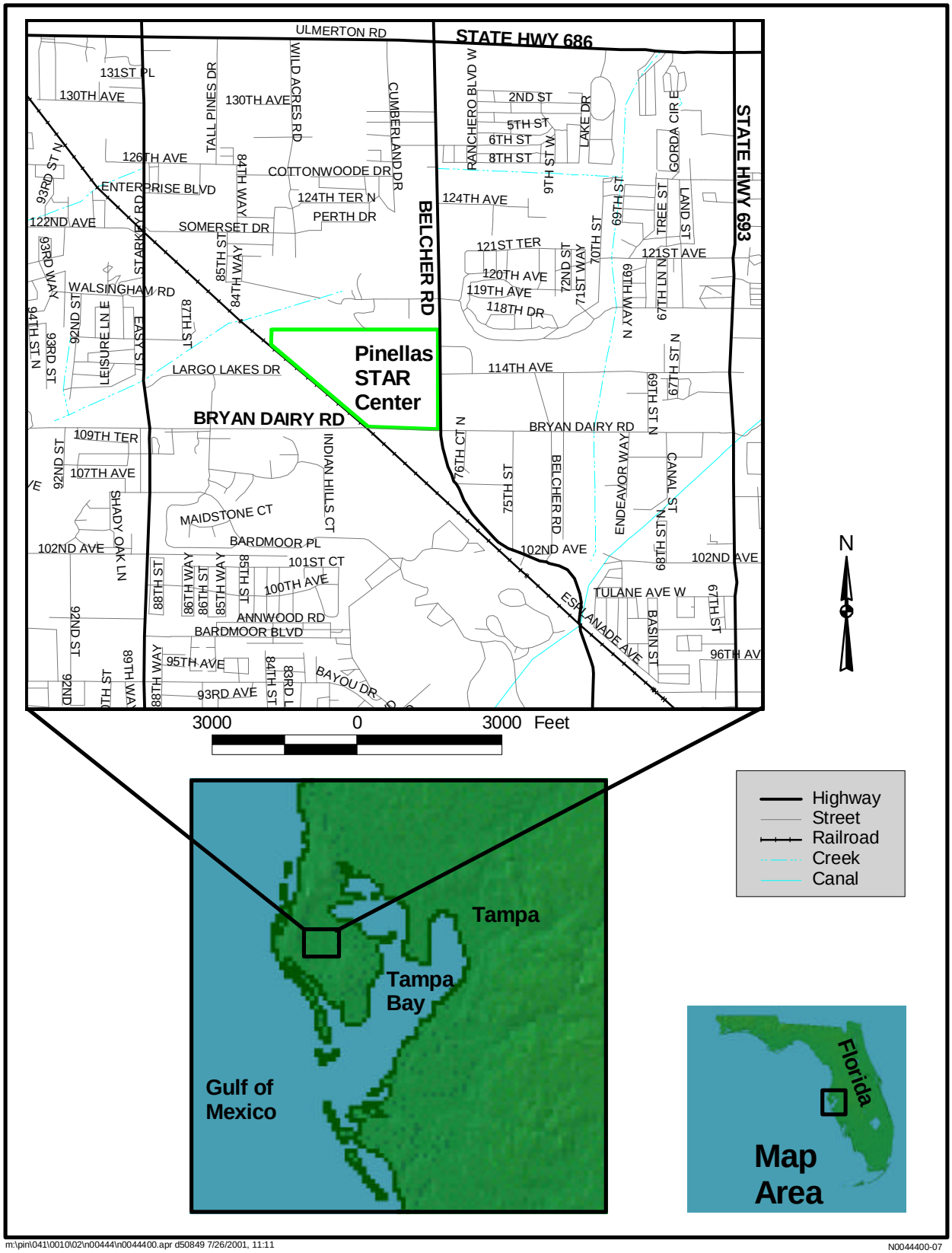

Figure 1. Pinellas STAR Center Location

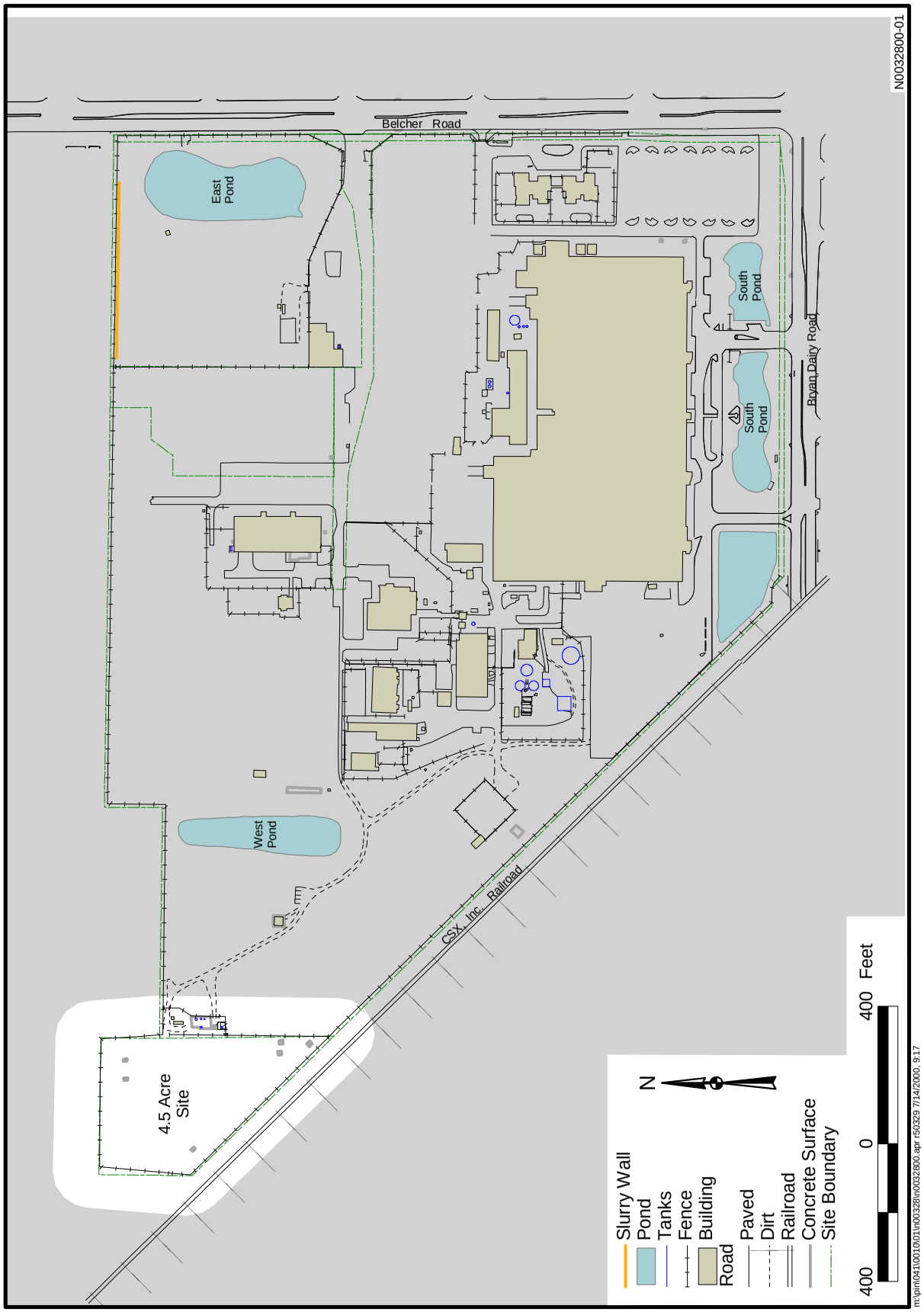

Figure 2. 4.5 Acre Site Location

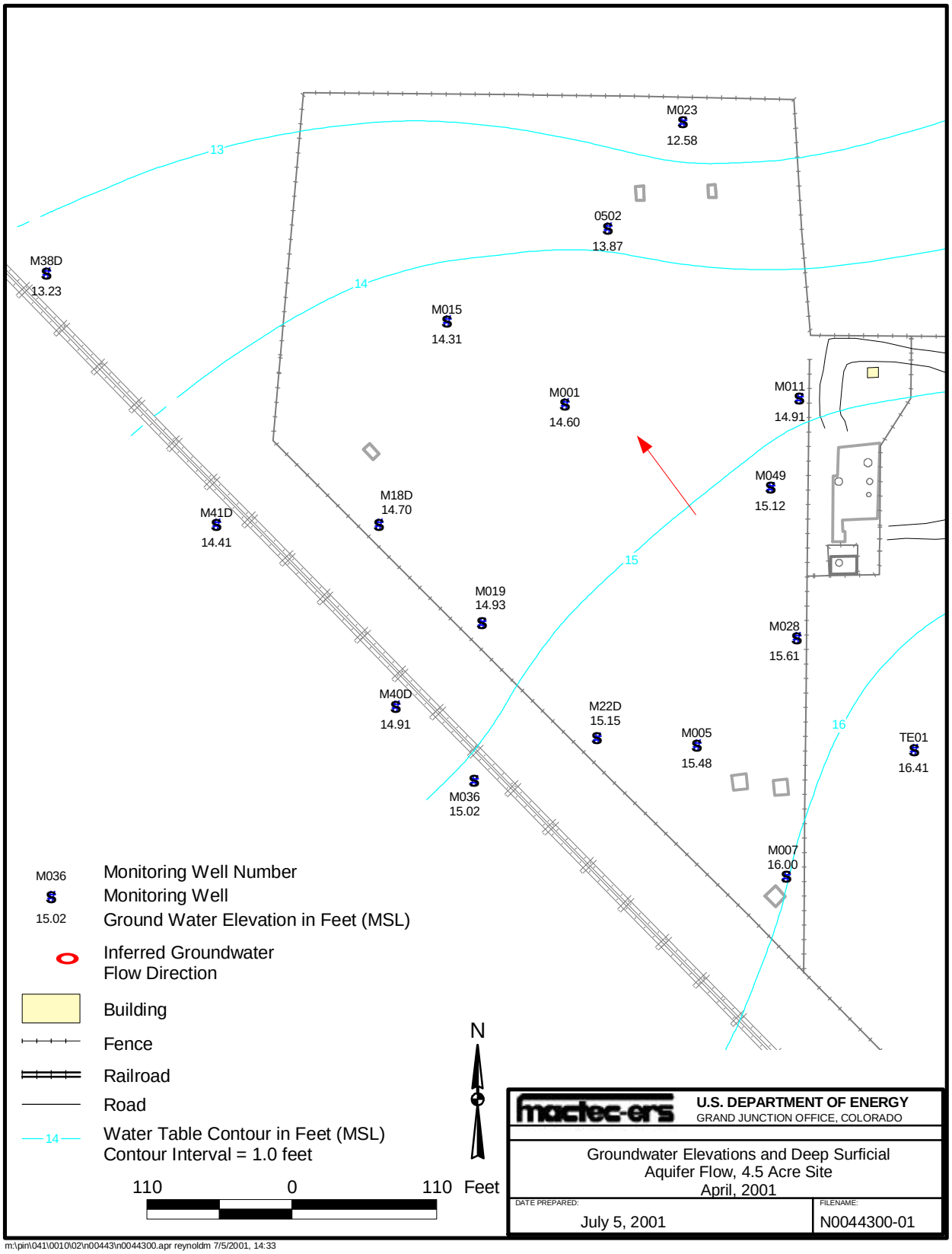

Figure 3. Groundwater Elevations and Deep Surficial Aquifer Flow, 4.5 Acre Site, April 2001

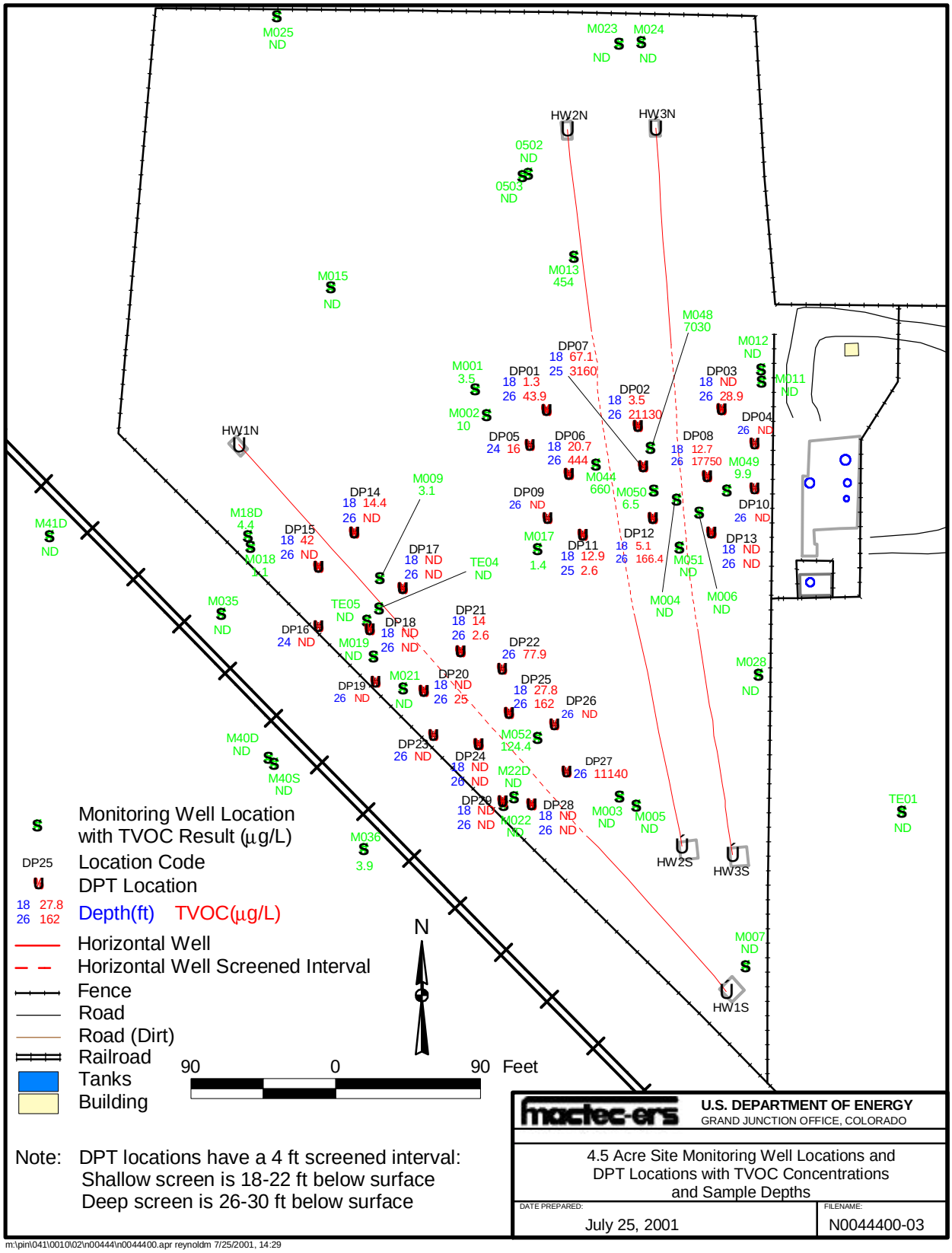

Figure 4. Monitoring Well Locations and DPT Locations with TVOC Concentrations and Sample Depths

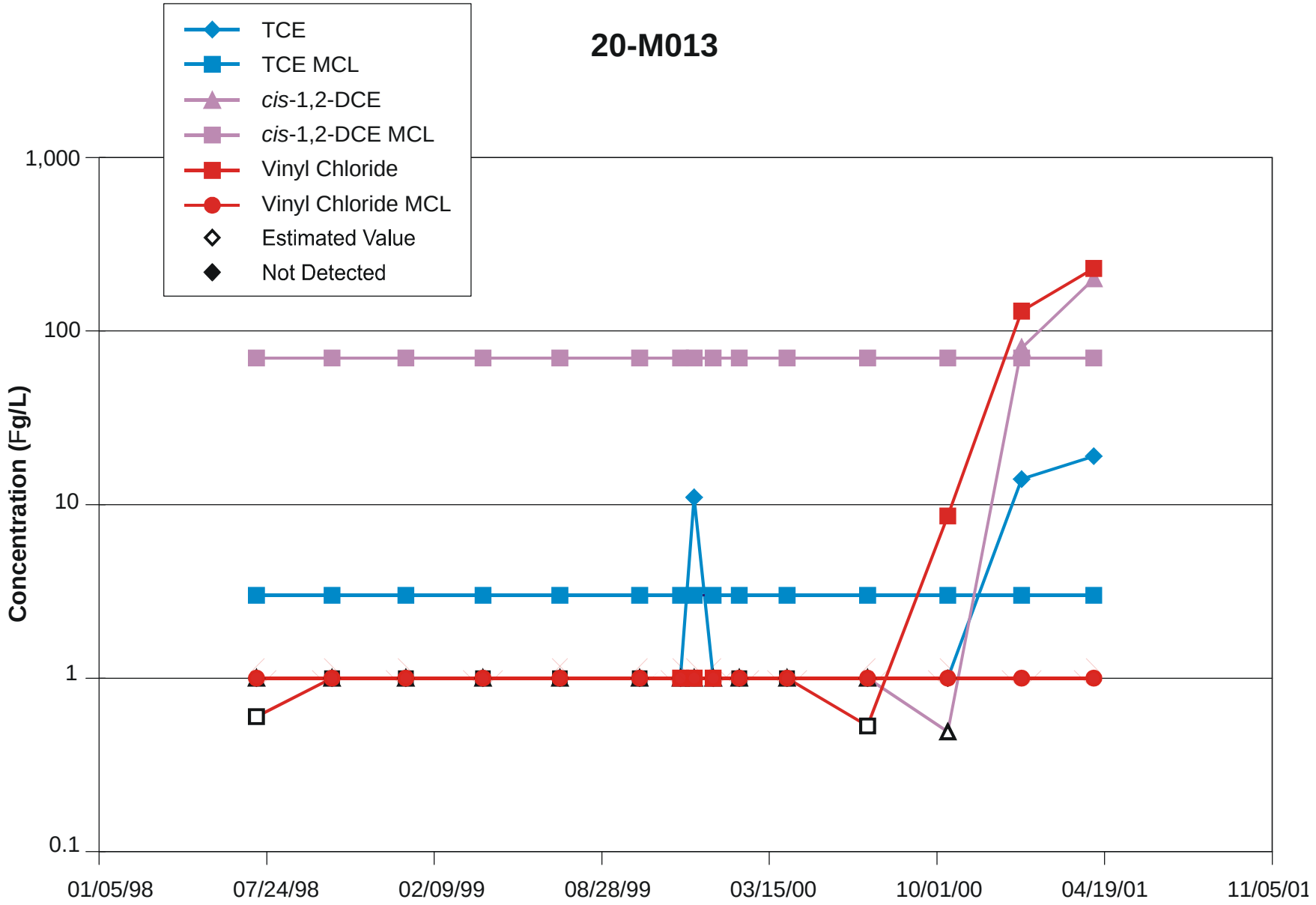

Figure 5. Time Concentration Plot for Monitoring Well PIN20–M013

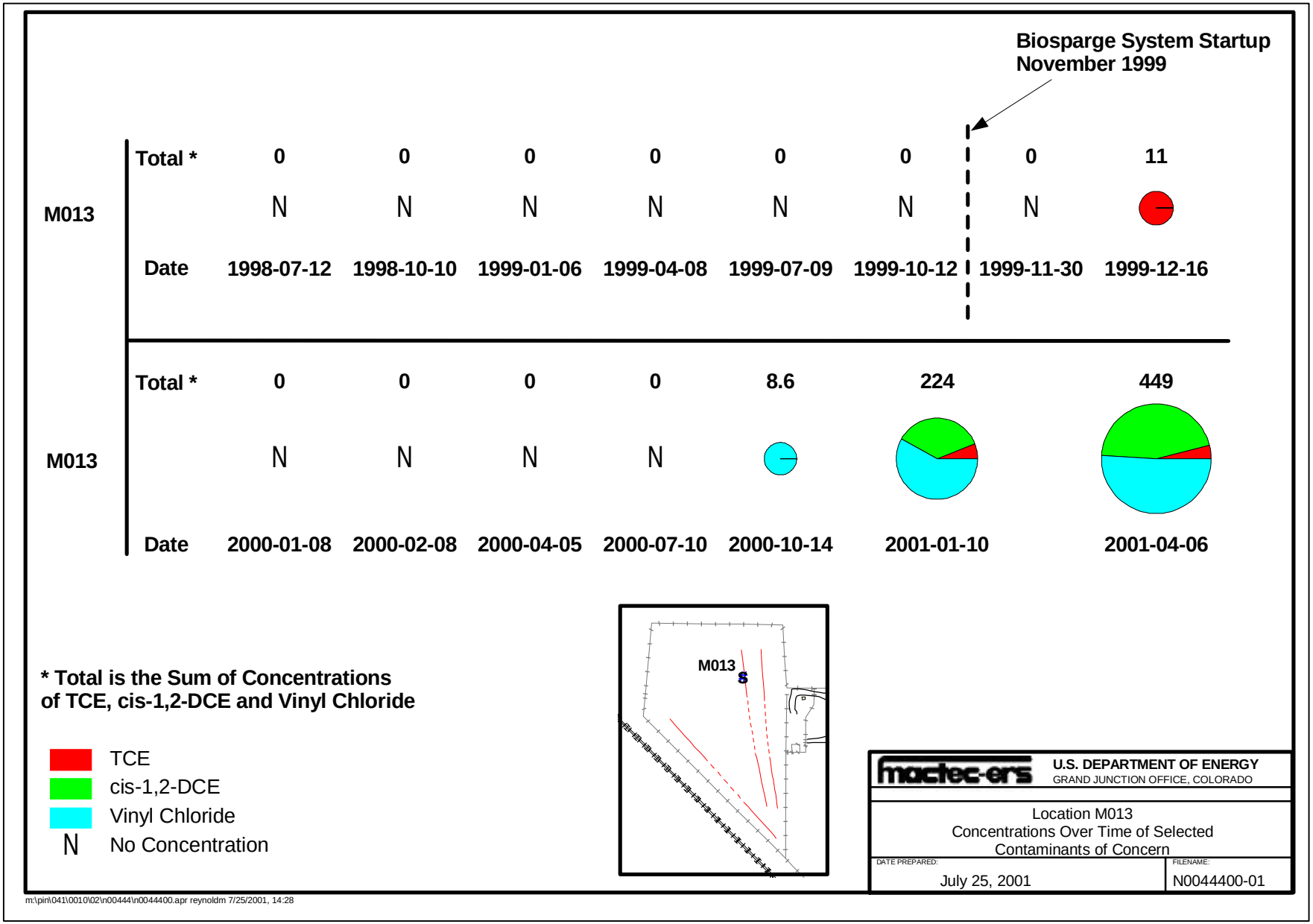

Figure 6. Concentrations Over Time of Selected Contaminants of Concern for Monitoring Well PIN20–M013

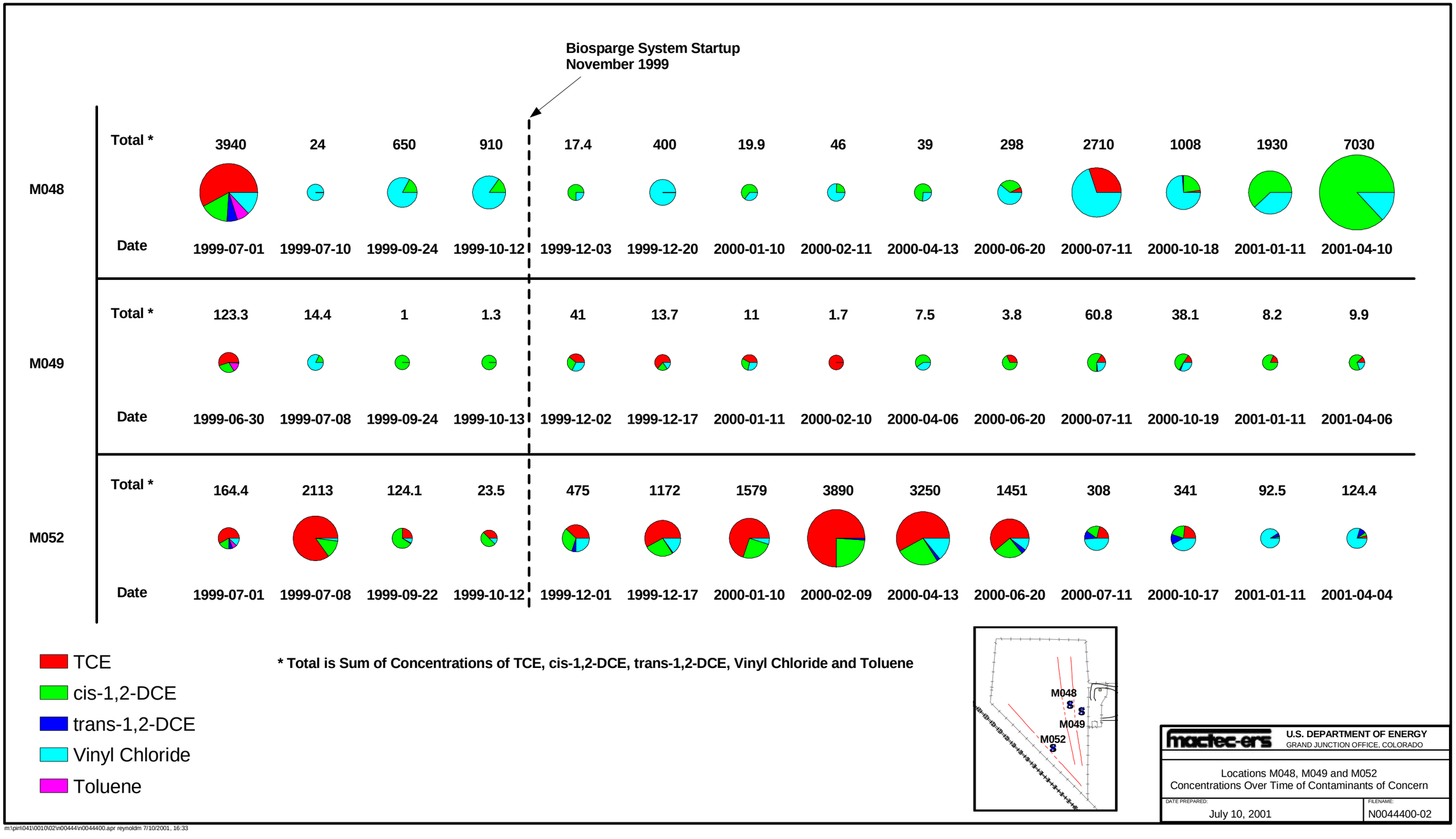

Figure 7. Concentrations Over Time of Contaminants of Concern, Wells PIN20–M048, –M049, and –M050

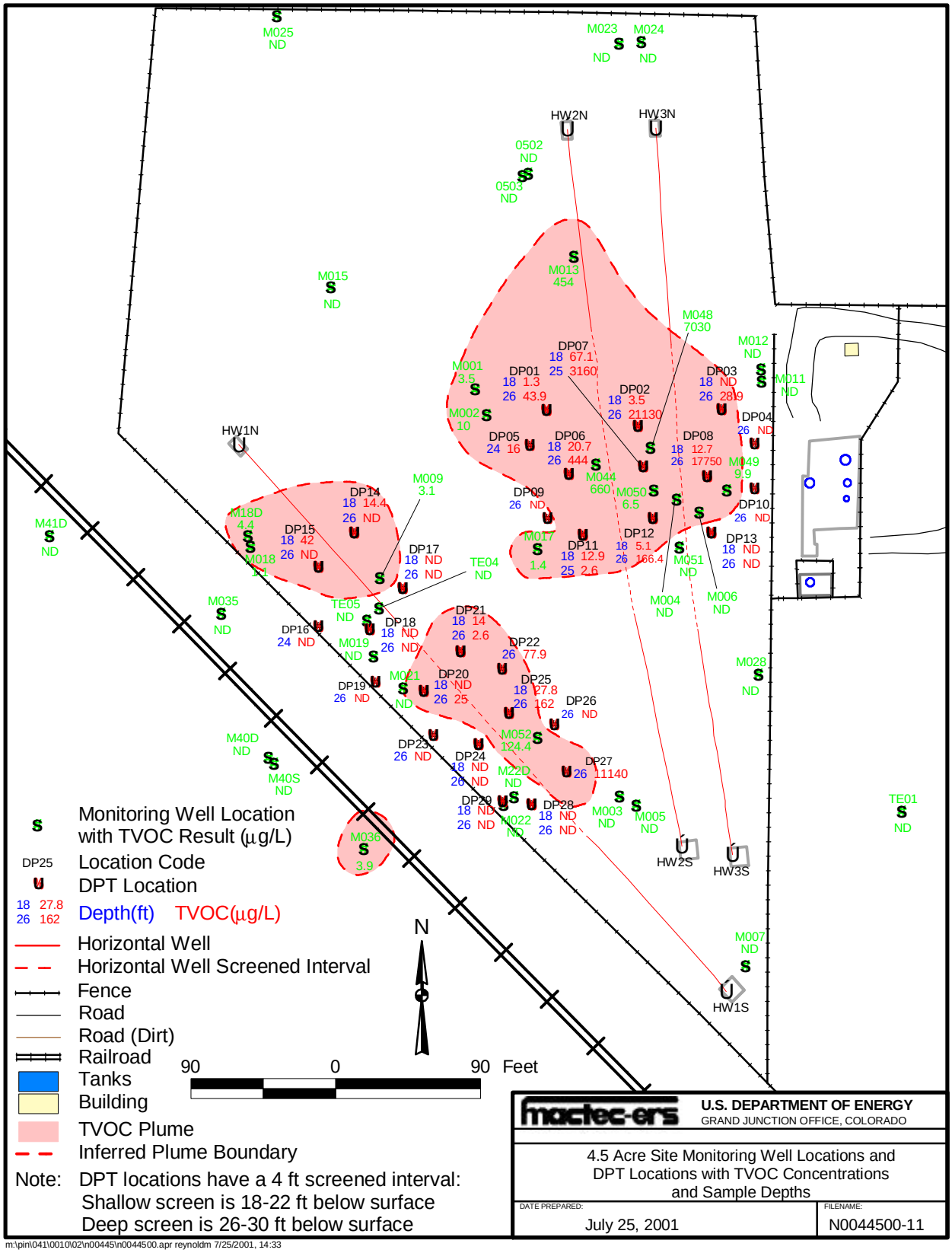

Figure 8. Monitoring Well Locations and DPT Locations with TVOCs Concentrations and Sample Depths

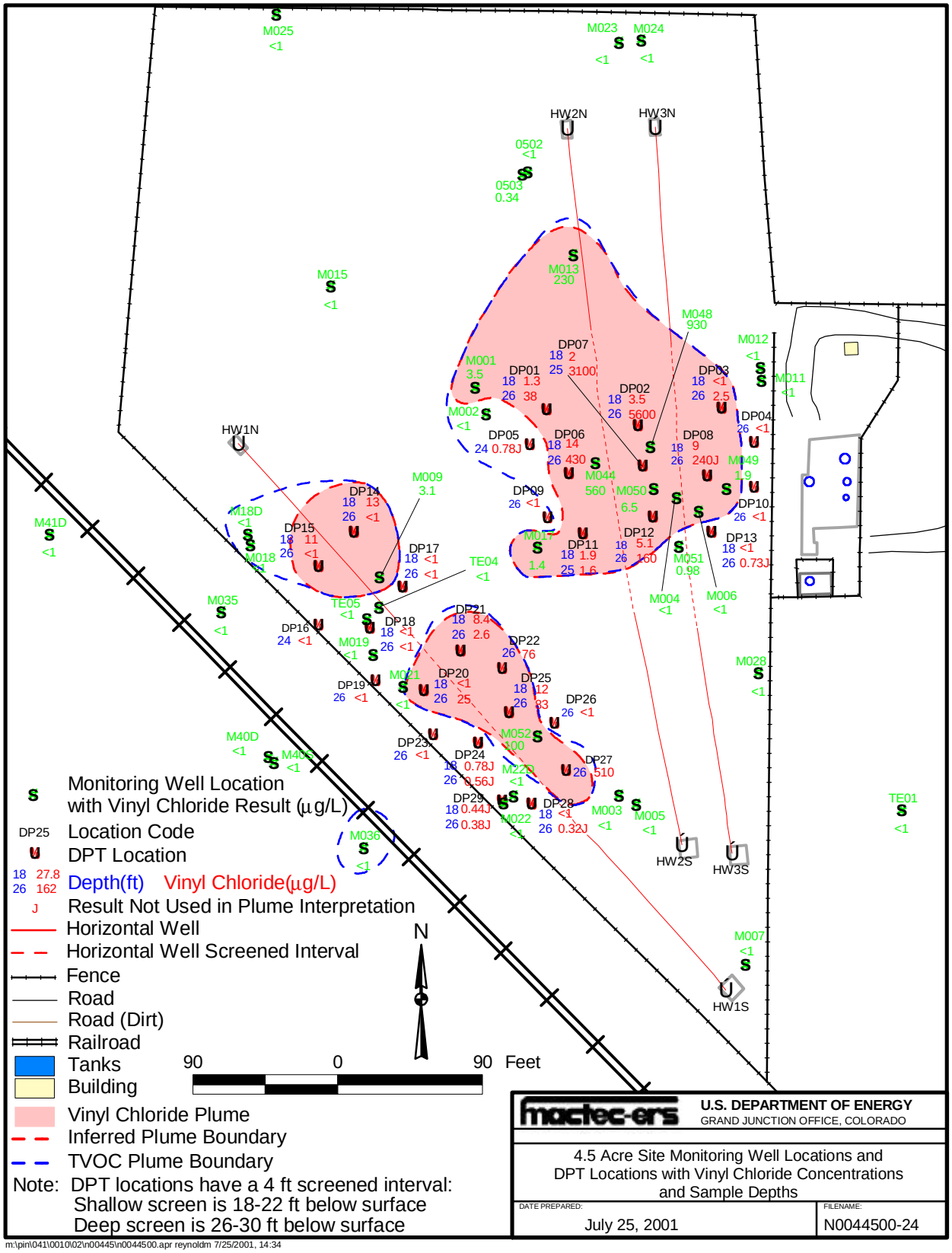

Figure 9. Monitoring Well Locations and DPT Locations with Vinyl Chloride Concentrations and Sample Depths

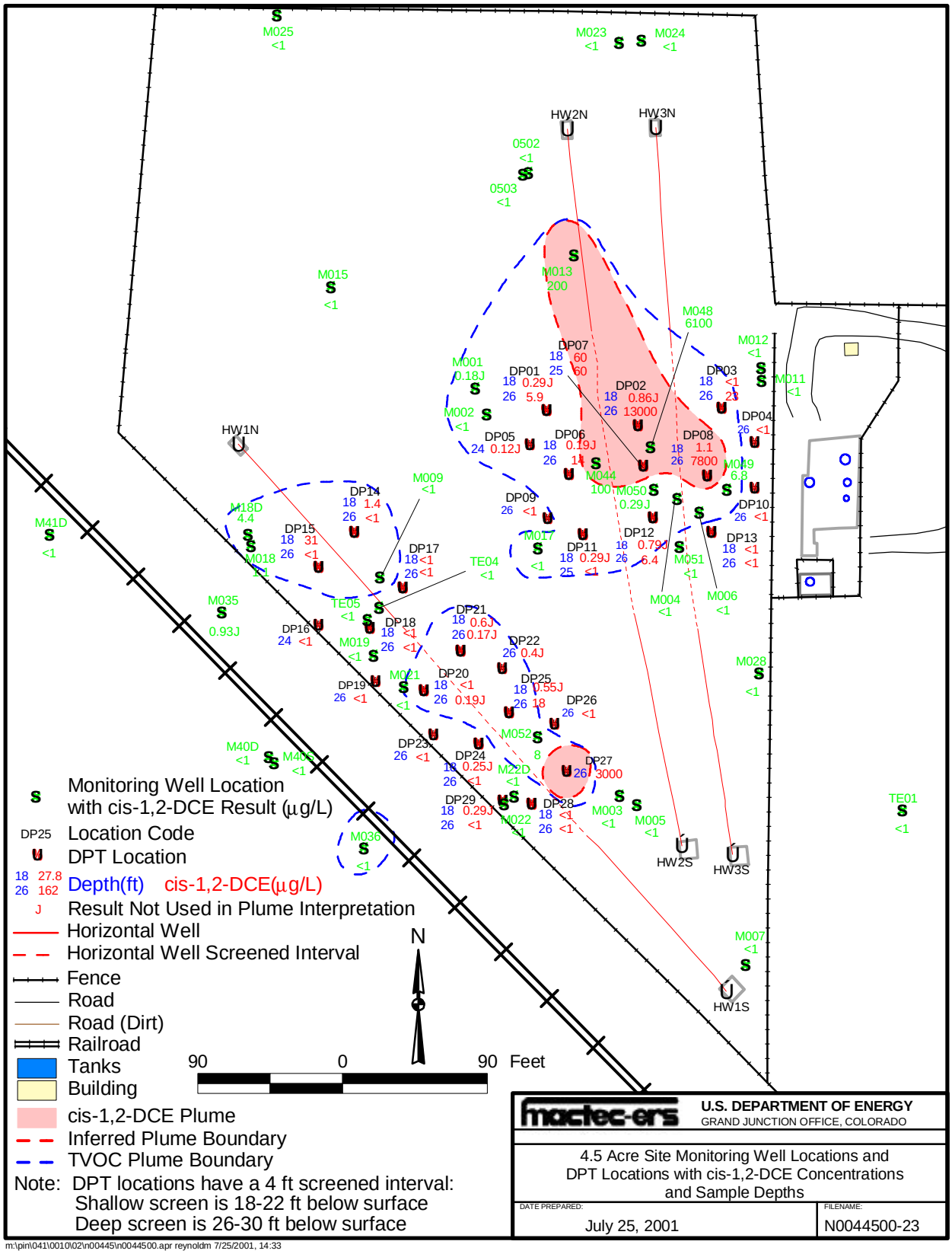

Figure 10. Monitoring Well Locations and DPT Locations with cis-1,2-DCE Concentrations and Sample Depths

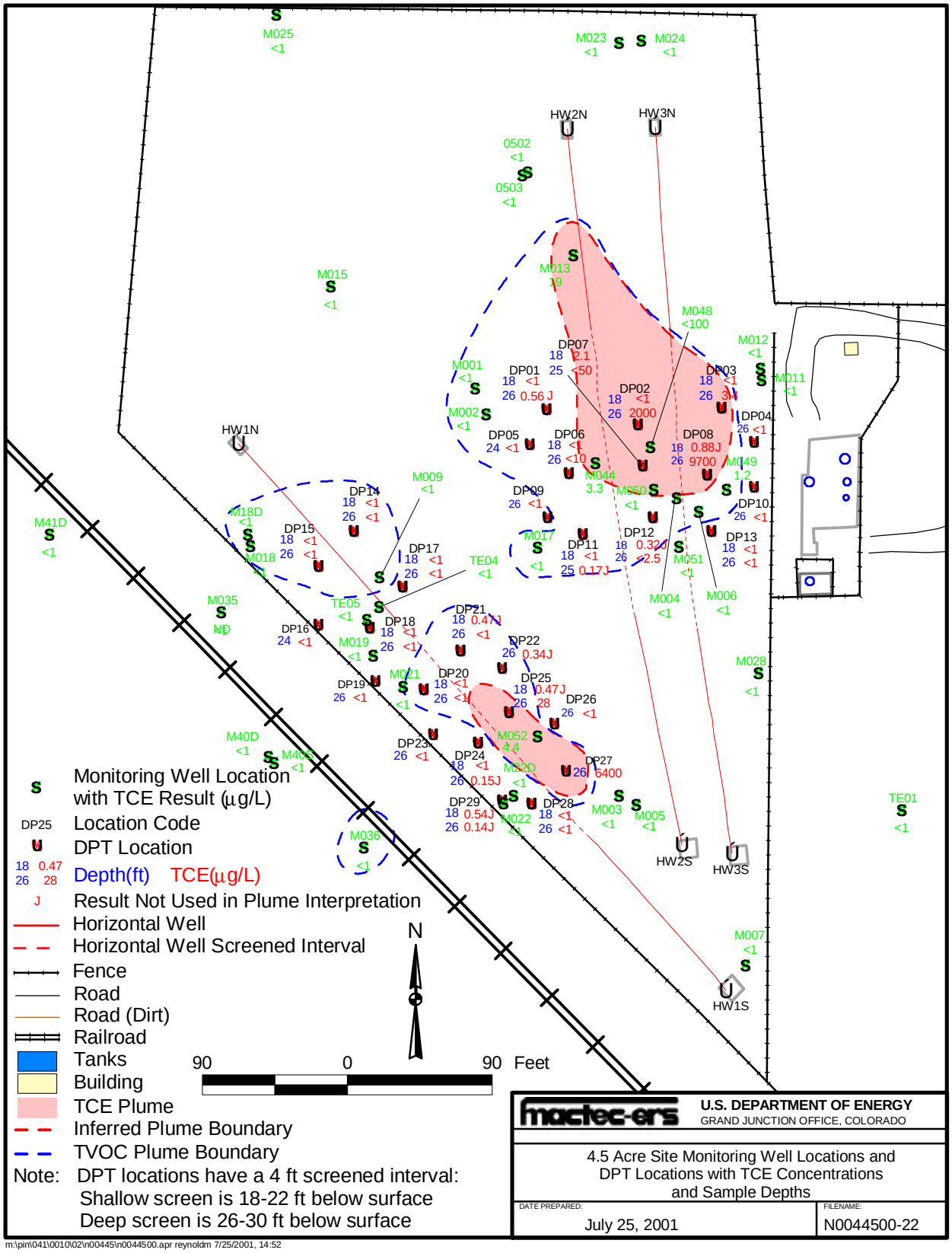

Figure 11. Monitoring Well Locations and DPT Locations with TCE Concentrations and Sample Depths

Table 1. Monitoring, Extraction, and Recovery Well Abandonment

Well Number	Well Type	Total Depth (ft - bls)	Screened Interval (ft - bls)	Casing Diameter/ Height above or bls (in.)	Well Material
PIN20–E001	Extraction	28.5	6.5-26.5	3/-36	PVC
PIN20–E002	Extraction	32.0	5.0-30.0	3/-35	PVC
PIN20–E003	Extraction	30	5.0-30.0	3/-33	PVC
PIN20–E004	Extraction	33.0	6.0-31.0	3/-35	PVC
PIN20–E005	Extraction	33.0	6.0-31.0	3/-36	PVC
PIN20–E006	Extraction	32.0	5.0-30.0	3/-32	PVC
PIN20–E007	Extraction	32.0	5.0-30.0	3/-33	PVC
PIN20–E008	Extraction	32.0	5.0-30.0	3/-33	PVC
PIN20–E009	Extraction	34.0	7.0-32.0	3/-33	PVC
PIN20–E010	Extraction	32.0	5.0-32.0	3/-33	PVC
PIN20–E011	Extraction	32.0	5.0-32.0	3/-33	PVC
PIN20–E012	Extraction	32.5	5.5-30.5	3/-36	PVC
PIN20–E013	Extraction	31.5	4.5-29.5	3/-33	PVC
PIN20–E014	Extraction	32.0	5.0-30.0	3/-38	PVC
PIN20–E015	Extraction	33.0	6.0-31.0	3/-37	PVC
PIN20–E016	Extraction	32.5	5.5-30.5	3/-35	PVC
PIN20–E017	Extraction	32.0	5.0-30.0	3/-32	PVC
PIN20–E018	Extraction	34.0	7.0-32.0	3/-31	PVC
PIN20–E019	Extraction	32.0	5.0-30.0	3/-32	PVC
PIN20–E020	Extraction	32.0	5.0-30.0	3/-37	PVC
PIN20–E021	Extraction	32.0	5.0-30.0	3/-37	PVC
PIN20–E022	Extraction	32.0	5.0-30.0	3/-35	PVC
PIN20–M002	Monitoring	13.5	8.0-13.0	2/+23	Stainless
PIN20–M004	Monitoring	15.0	9.0-14.0	2/+6	Stainless
PIN20–M006	Monitoring	29.5	23.5-28.5	2/+14	Stainless
PIN20–M009	Monitoring	30.0	24.0-29.0	2/+25	Stainless
PIN20–M013	Monitoring	29.0	23.0-28.0	2/+24	Stainless
PIN20–M017	Monitoring	29.0	23.0-28.0	2/+23	Stainless
PIN20–M018	Monitoring	14.5	8.5-13.5	2/+15	Stainless
PIN20–M021	Monitoring	13.5	8.5-13.5	2/+16	Stainless
PIN20–M022	Monitoring	15.0	9.5-14.5	2/+6	Stainless
PIN20–TE04	Monitoring	24.0	not available	2/+32	PVC
PIN20–TE05	Monitoring	15.0	not available	2/+27	PVC
PIN20–M044	Monitoring	30.0	20.0-30.0	2/+36	PVC
PIN20–M048	Monitoring	30.0	20.0-30.0	2/+36	PVC
PIN20–M050	Monitoring	30.0	20.0-30.0	2/+36	PVC
PIN20–M051	Monitoring	30.0	20.0-30.0	2/+36	PVC
PIN20–M052	Monitoring	29.0	19.0-29.0	2/+36	PVC

Table 2. Monitoring Well Installations

Well Number	Total Depth (ft - bls)	Screened Interval (ft)	Filter Pack Interval (ft)	Casing Dia./ Min. Stickup (in.)	Well Material
PIN20–M053	30	20–30	17–30	2/24	PVC
PIN20–M054	30	20–30	17–30	2/24	PVC

Table 3. 4.5-Acre Site Performance Monitoring

Location ID	Sample Depth (ft)
DP01	22 & 30
DP02	22 & 30
DP03	22 & 30
DP04	30
DP05	28
DP06	22 & 30
DP07	22 & 29
DP08	22 & 30
DP09	30
DP10	30
DP11	22 & 29
DP12	22 & 30
DP13	22 & 30
DP14	22 & 30
DP15	22 & 30
DP16	28
DP17	22 & 30
DP18	22 & 30
DP19	30
DP20	22 & 30
DP21	22 & 30
DP22	30
DP23	30
DP24	22 & 30
DP25	22 & 30
DP26	30
DP27	30
DP28	22 & 30
DP29	22 & 30
Total Number of Samples	48

Table 4. Water-Level Data at the 4.5 Acre Site

WELL ID	FLOW CODE	TOP OF CASING ELEVATION (FT NGVD)	MEASUREMENT DATE	MEASUREMENT TIME	WATER DEPTH FROM TOP OF CASING (FT)	GROUND WATER ELEVATION (FT NGVD)	WATER LEVEL FLAG
PIN20 [illegible]							
0502	O	19.25	04/02/2001	09:38	5.38	13.87	
0503	O	19.05	04/02/2001	09:37	5.16	13.89	
M001	O	19.55	04/02/2001	10:51	4.95	14.60	
M002	O	19.56	04/02/2001	10:50	4.83	14.73	
M003	O	19.34	04/02/2001	10:25	3.74	15.60	
M004	O	18.70	04/02/2001	10:40	3.58	15.12	
M005	O	19.65	04/02/2001	10:28	4.17	15.48	
M006	O	19.33	04/02/2001	10:38	4.24	15.09	
M007	O	19.45	04/02/2001	10:30	3.45	16.00	
M009	O	18.66	04/02/2001	09:53	3.86	14.80	
M011	O	19.38	04/02/2001	09:26	4.47	14.91	
M012	O	19.45	04/02/2001	09:30	4.44	15.01	
M013	O	19.69	04/02/2001	09:35	5.41	14.28	
M015	O	19.05	04/02/2001	09:46	4.74	14.31	
M017	O	19.72	04/02/2001	10:46	4.88	14.84	
M018	O	19.38	04/02/2001	09:51	4.59	14.79	
M019	O	19.90	04/02/2001	10:17	4.97	14.93	
M021	O	19.35	04/02/2001	10:19	4.41	14.94	
M022	F	18.64	04/02/2001	10:24	3.48	15.16	
M023	O	19.47	04/02/2001	09:41	6.89	12.58	
M024	O	19.04	04/02/2001	09:40	5.81	13.23	
M025	O	17.64	04/02/2001	09:44	4.52	13.12	
M028	O	21.38	04/02/2001	10:33	5.77	15.61	
M035	F	19.62	04/02/2001	07:38	4.75	14.87	
M036	F	20.92	04/02/2001	07:35	5.90	15.02	
M044	O	20.65	04/02/2001	10:43	5.95	14.70	
M048	O	20.97	04/02/2001	10:45	6.08	14.89	
M049	O	20.88	04/02/2001	10:53	5.76	15.12	

Table 4 (continued). Water-Level Data at the 4.5 Acre Site

	WELL ID	FLOW CODE	TOP OF CASING ELEVATION (FT NGVD)	MEASUREMENT DATE	MEASUREMENT TIME	WATER DEPTH FROM TOP OF CASING (FT)	GROUND WATER ELEVATION (FT NGVD)	WATER LEVEL FLAG
PIN20	[illegible]							
	M050	O	20.97	04/02/2001	10:42	6.05	14.92	
	M051	O	21.50	04/02/2001	10:35	6.44	15.06	
	M052	O	20.76	04/02/2001	10:20	5.66	15.10	
	M18D	O	20.58	04/02/2001	09:48	5.88	14.70	
	M22D	O	20.31	04/02/2001	10:23	5.16	15.15	
	M38D	F	20.73	04/02/2001	07:23	7.50	13.23	
	M40D	F	20.79	04/02/2001	07:31	5.88	14.91	
	M40S	F	21.36	04/02/2001	07:33	6.41	14.95	
	M41D	O	22.07	04/02/2001	07:27	7.66	14.41	
	TE01	O	20.85	04/02/2001	11:00	4.44	16.41	
	TE04	O	20.40	04/02/2001	10:13	5.53	14.87	
	TE05	O	20.02	04/02/2001	10:15	5.17	14.85	

FLOW CODES:
F OFF-SITE O ON-SITE

WATER LEVEL FLAGS:

Table 5. Field Measurements of Samples Collected From Wells at the 4.5 Acre Site

Location	Temperature (°C)	Specific Conductance (µmhos/cm)[a]	Turbidity (NTU)	pH	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)
PIN20	**4.5 ACRE SITE**					
0502	24.41	832	27	6.88	-24	--
0503	24.36	711	16.1	6.99	-71.6	0.64
M001	24.08	774	13.2	6.78	8.2	1.02
M002	23.05	1,735	13.7	6.76	62.5	1.27
M003	23.16	2,055	13.8	6.93	154.4	6.68
M004	22.37	2,019	2.1	6.88	34.2	2.46
M005	24.73	1,106	4.9	6.79	-40.2	1.56
M006	24.73	1,009	10.3	6.95	-110	4.76
M007	23.79	829	0.8	6.93	-33.5	2.62
M009	24.51	980	0.5	6.97	2.9	2.17
M011	24.3	862	9.3	6.84	-79.3	0.93
M012	22.81	941	12.9	6.95	-4.9	0.18
M013	24.68	1,215	2.5	6.72	-51.4	1.19
M015	24.41	720	1.5	6.81	-77.2	1.43
M017	25.09	819	2.9	6.84	8.2	0.95
M018	22.34	2,989	4.6	6.87	139.6	0.95
M019	23.44	847	13.3	6.84	67	2.53
M021	23.13	3,401	8.4	7.31	262.3	4
M022	22.83	2,346	5	6.84	241.6	2.79
M023	24.16	966	28.7	6.87	-95.8	0.7
M024	23.44	719	5.9	6.88	-1.8	0.63
M025	21.79	1,807	42.7	6.53	64.4	0.85
M028	24.28	792	7.3	6.75	-57.8	1.96
M035	22.74	2,094	13	6.69	109.1	2.3
M036	24.1	785	11.7	6.85	-47.2	1.09
M044	24.82	2,390	1,203.1	6.23	20.3	0.41
M048	24.89	2,268	40.3	6.48	-90.7	1.59
M049	24.99	1,056	33.3	6.81	-90.4	0.49
M050	24.59	1,310	7.1	6.81	-100.9	0.74
M051	25.07	1,320	104.3	6.64	56.7	1.94
M052	24.33	1,457	17.5	7	-47.2	1.71
M18D	24.02	879	19.6	7.01	-48.2	1.65
M22D	24.49	906	6.8	7	-61.7	0.99
M38D	23.23	778	3.2	6.93	-23.5	3.35
M40D	23.62	884	12	6.94	-22.4	1.42
M40S	22.05	264	4.5	6.36	94.1	1.32
M41D	22.68	864	20.5	6.82	-40.6	2.08
TE01	23.75	175	13.6	5.77	329.2	1.17
TE04	24.19	1,778	54.7	6.81	54.8	2.74
TE05	22.95	2,020	19.9	7.55	169	4.66

[a]temperature corrected to 25°C
-- Not measured

Table 6. Field Measurements of Samples Collected From DPT Locations at the 4.5 Acre Site

Location	Depth (ft bls)	Temperature (°C)	Specific Conductance (µmhos/cm)[a]	Turbidity (NTU)	pH	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Field Ferrous Iron (mg/L)	Field Total Iron (mg/L)
PIN20		4.5 ACRE SITE							
DP01	18	24.3	584	384	6.91	-156	1.39	1.2	4.4
DP01	26	25	987	1,492	6.82	-213	1.89	6.2	7
DP02	18	25.2	1,477	256	6.59	-133	8.79	27	32.4
DP02	26	25.6	1,174	626	6.43	-84	7.56	4	5.2
DP03	18	24.2	1,012	398	6.68	-119	4.99	10.8	11.4
DP03	26	26	734	1,498	7.5	-48	9.51	--	--
DP04	26	23.7	753	1,004	6.79	-90	1.31	2.42	2.51
DP05	24	24.2	600	689	6.84	-129	0.76	7	8.5
DP06	18	25	857	311	6.81	-125	3.93	9.35	10.35
DP06	26	27.1	772	1,502	7.11	-67	4.77	0.08	0.05
DP07	18	25.1	2,630	68	6.57	-46	5.04	2	2.35
DP07	24.5	25.9	739	817	6.66	-91	3.43	5.6	6.3
DP08	18	25.1	776	380	6.73	-107	9.66	7.5	8.7
DP08	26	25.4	882	1,059	6.69	-76	9.99	2.14	2.24
DP09	26	24.9	878	326	6.76	-111	0.23	7	7.3
DP10	26	24.2	753	1,400	6.81	-84	0.91	2.22	2.23
DP11	18	25.1	718	865	6.88	-124	2.34	6.1	7.2
DP11	25	25.4	875	624	6.76	-106	2.69	5	6.1
DP12	18	24.2	1,375	295	6.69	-112	0.16	11.6	12.8
DP12	26	24.9	765	1,248	6.82	-104	0.61	2.82	2.88
DP13	18	24.5	1,404	780	6.56	-110	0.19	22.4	22.3
DP13	26	25	841	955	6.81	-100	1.09	1.3	1.39
DP14	18	24.6	631	614	6.94	-141	0.76	6.1	6.9
DP14	26	25.3	762	917	6.87	-102	0.8	2	2.6
DP15	18	24.6	716	590	6.98	-138	1.25	5	6.3
DP16	23.5	24.6	705	1,183	6.88	-134	1.44	5	5.6
DP17	18	24.9	594	477	6.95	-138	1.53	4.2	6.5
DP17	26	26	751	976	6.79	-111	2.91	2	2.5
DP18	18	24.7	822	408	6.89	-123	3.39	5.1	5.4
DP18	26	25.2	884	644	6.92	-102	3.21	1.84	1.87
DP19	26	25	751	798	6.86	-100	4.35	2.14	2.19
DP20	18	24.4	831	626	6.87	-114	5.07	4.2	4.4
DP20	26	24.9	734	1,493	6.85	-96	4.92	2.99	3.11
DP21	18	24.4	1,149	1,490	6.73	-117	11.91	10.8	12.1
DP21	26	24.9	882	1,492	6.72	-96	10.22	2.9	3.1
DP22	26	24.1	877	1,074	6.85	-83	9.33	1.73	1.74
DP23	26	23.5	684	955	6.97	-120	6.07	3.4	3.9

Table 6 (continued). Field Measurements of Samples Collected From DPT Locations at the 4.5 Acre Site

Location	Depth (ft bls)	Temperature (°C)	Specific Conductance (µmhos/cm)[a]	Turbidity (NTU)	pH	Oxidation Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Field Ferrous Iron (mg/L)	Field Total Iron (mg/L)
DP24	18	24	1,337	1,109	6.63	-110	3.37	9	9.4
DP24	26	26.5	649	1,499	7.36	-71	11.11	--	--
DP25	18	24.8	2,277	315	6.43	-89	1.34	25.8	26.5
DP25	26	25.4	1,105	1,260	6.74	-96	4.26	4.4	4.7
DP26	26	24	855	1,045	6.89	-103	7.18	2.66	2.76
DP27	26	25.8	875	1,495	6.81	-92	6.84	0.89	1.17
DP28	18	23.9	542	476	6.99	-128	5.01	3.1	5.2
DP28	26	24.3	791	968	6.81	-105	8.36	1.99	2.13
DP29	18	24.4	607	610	6.94	-127	8.45	3.4	5.2
DP29	26	25.5	878	1,250	6.77	-103	7.1	0.83	0.96

[a]temperature corrected to 25 °C
-- Not measured

Table 7. Total VOCs Concentrations From Wells at the 4.5 Acre Site
(reported in micrograms per liter)

Location	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl chloride	1,1-DCA	Chloro-ethane	Methylene chloride	Total VOCs[a]
PIN20	**4.5 ACRE SITE**								
0502	<1	<1	<1	<1	<1	<1	<1	<5	ND
0503	<1	<1	<1	<1	0.34J	<1	<1	1.2J	ND[c]
M001	<1	0.18J	<1	<1	3.5	<1	<1	<5	3.5[b]
M002	<1	<1	<1	<1	<1	<1	<1	<5	10[c]
M003	<1	<1	<1	<1	<1	<1	<1	0.47J	ND
M004	<1	<1	<1	<1	<1	<1	<1	<5	ND
M005	<1	<1	<1	<1	<1	<1	<1	0.53J	ND
M006	<1	<1	<1	<1	<1	<1	<1	0.31J	ND
M007	<1	<1	<1	<1	<1	<1	<1	0.22J	ND[b,c]
M009	<1	<1	<1	<1	3.1	<1	<1	4.2J	3.1[b]
M011	<1	<1	<1	<1	<1	<1	<1	0.45J	ND
M012	<1	<1	<1	<1	<1	<1	<1	0.54J	ND
M013	19	200	5	3.5J	230	<5	<5	3.7J	454[b]
M015	<1	<1	<1	<1	<1	<1	<1	<5	ND
M017	<1	<1	<1	<1	1.4	<1	<1	<5	1.4
M018	<1	1.1	<1	<1	<1	<1	<1	1.4J	1.1[b]
M019	<1	<1	<1	<1	<1	<1	<1	0.52J	ND
M021	<1	<1	<1	<1	<1	<1	<1	0.94J	ND
M022	<1	<1	<1	<1	<1	<1	<1	1.1J	ND
M023	<1	<1	<1	<1	<1	<1	<1	<5	ND
M024	<1	<1	<1	<1	<1	<1	<1	<5	ND
M025	<1	<1	<1	<1	<1	<1	<1	<5	ND
M028	<1	<1	<1	<1	<1	<1	<1	0.39J	ND
M035	<1	0.93J	<1	<1	<1	<1	<1	0.63J	ND
M036	<1	<1	<1	<1	<1	<1	<1	0.82J	3.9[b]
M044	3.3J	100	6.1J	<25	560	<25	<25	<120	660
M048	<100	6,100	94J	<100	930	<100	<100	89J	7,030
M049	1.2	6.8	0.17J	<1	1.9	<1	<1	0.53J	9.9
M050	<1	0.29J	<1	<1	6.5	<1	<1	0.38J	6.5
M051	<1	<1	<1	<1	0.98J	<1	<1	0.31J	ND
M052	4.4	8	12	<2.5	100	<2.5	<2.5	8.8J	124.4
M18D	<1	4.4	<1	<1	<1	<1	<1	3.6J	4.4
M22D	<1	<1	<1	<1	<1	<1	<1	1J	ND
M38D	<1	<1	<1	<1	<1	<1	<1	0.95J	ND
M40D	<1	<1	<1	<1	<1	<1	<1	0.7J	ND
M40S	<1	<1	<1	<1	<1	<1	<1	0.79J	ND
M41D	<1	<1	<1	<1	<1	<1	<1	1.3J	ND
TE01	<1	<1	<1	<1	<1	<1	<1	<5	ND
TE04	<1	<1	<1	<1	<1	<1	<1	1.6J	ND
TE05	<1	<1	<1	<1	<1	<1	<1	0.94J	ND

[a]"J" values are not included in the "Total VOCs" value.
[b]See the "BTEX Table" for additional analytical results.
[c]See the "Additional VOCs Table" for additional analytical results.
ND Not detected.
J Estimated value, result is between the reporting limit and the method detection limit.

Table 8. Total VOCs Concentrations From DPT Locations at the 4.5 Acre Site (reported in micrograms per liter)

Location	Depth (ft bls)	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl chloride	1,1-DCA	Chloro-ethane	Methylene chloride	Total VOCs[a]
PIN20		4.5 ACRE SITE								
DP01	18	<1	0.29J	<1	<1	1.3	<1	<1	0.39J	1.3
DP01	26	0.56J	5.9	0.56J	0.17J	38	<1	<1	<5	43.9[b,c]
DP02	18	<1	0.86J	<1	<1	3.5	<1	<1	<5	3.5
DP02	26	2,000	13,000	530	100J	5,600	<250	<250	110J	21,130
DP03	18	<1	<1	<1	<1	<1	<1	<1	0.46J	ND
DP03	26	3.4	23	0.74J	<1	2.5	<1	<1	<5	28.9[b]
DP04	26	<1	<1	<1	<1	<1	<1	<1	<5	ND[b]
DP05	24	<1	0.12J	<1	<1	0.78J	<1	0.32J	0.32J	16[b]
DP06	18	<1	0.19J	<1	<1	14	<1	<1	<5	20.7[b]
DP06	26	<10	14	<10	<10	430	<10	<10	<50	444[b]
DP07	18	2.1	60	3	<1	2	<1	<1	<5	67.1
DP07	24.5	<50	60	<50	<50	3,100	<50	<50	<250	3,160
DP08	18	0.88J	1.1	<1	0.15J	9	<1	<1	<5	12.7[b]
DP08	26	9,700	7,800	250	52J	240J	<250	<250	<1,200	17,750
DP09	26	<1	<1	<1	<1	<1	<1	0.56J	<5	ND
DP10	26	<1	<1	<1	<1	<1	<1	<1	<5	ND
DP11	18	<1	0.29J	<1	<1	1.9	<1	<1	<5	12.9[b,c]
DP11	25	0.17J	<1	<1	<1	1.6	<1	1	<5	2.6[b]
DP12	18	0.32J	0.79J	<1	<1	5.1	<1	<1	<5	5.1
DP12	26	<2.5	6.4	<2.5	<2.5	160	<2.5	<2.5	<12	166.4
DP13	18	<1	<1	<1	<1	<1	<1	<1	0.49J	ND
DP13	26	<1	<1	<1	<1	0.73J	<1	<1	<5	ND
DP14	18	<1	1.4	<1	<1	13	<1	<1	<5	14.4[b]
DP14	26	<1	<1	<1	<1	<1	<1	<1	<5	ND[b]
DP15	18	<1	31	0.71J	<1	11	<1	<1	<5	42[b]
DP15	26	<1	<1	<1	<1	<1	<1	<1	<5	ND[b,c]
DP16	23.5	<1	<1	<1	<1	<1	<1	<1	2.4J	ND[b,c]
DP17	18	<1	<1	<1	<1	<1	<1	<1	2.2J	ND[b,c]
DP17	26	<1	<1	<1	<1	<1	<1	<1	2.2J	ND[b]
DP18	18	<1	<1	<1	<1	<1	<1	<1	2.2J	ND[c]
DP18	26	<1	<1	<1	<1	<1	<1	<1	<5	ND[b,c]
DP19	26	<1	<1	<1	<1	<1	<1	<1	<5	ND[b]
DP20	18	<1	<1	<1	<1	<1	<1	<1	<5	ND[b,c]
DP20	26	<1	0.19J	0.14J	<1	25	<1	<1	<5	25
DP21	18	0.47J	0.6J	5.6	<1	8.4	<1	<1	<5	14
DP21	26	<1	0.17J	0.2J	<1	2.6	<1	<1	<5	2.6[b]
DP22	26	0.34J	0.4J	1.9	<1	76	<1	<1	<5	77.9[b]

Table 8 (continued). Total VOCs Concentrations From DPT Locations at the 4.5 Acre Site (reported in micrograms per liter)

Location	Depth (ft bls)	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl chloride	1,1-DCA	Chloro-ethane	Methylene chloride	Total VOCs[a]
DP23	26	<1	<1	<1	<1	<1	<1	<1	<5	ND
DP24	18	<1	0.25J	<1	<1	0.78J	<1	<1	<5	ND
DP24	26	0.15J	<1	<1	<1	0.56J	<1	<1	<5	ND
DP25	18	0.47J	0.55J	1.7	<1	12	<1	<1	<5	27.8[b]
DP25	26	28	18	33	0.88J	83	<2.5	<2.5	<12	162[b]
DP26	26	<1	<1	<1	<1	<1	<1	<1	<5	ND
DP27	26	6,400	3,000	1,100	130	510	<100	<100	<500	11,140
DP28	18	<1	<1	<1	<1	<1	<1	<1	<5	ND
DP28	26	<1	<1	<1	<1	0.32J	<1	<1	0.32J	ND
DP29	18	0.54J	0.29J	<1	<1	0.44J	<1	<1	<5	ND
DP29	26	0.14J	<1	<1	<1	0.38J	<1	<1	<5	ND[b,c]

[a]"J" values are not included in the "Total VOCs" value.
[b]See the "BTEX Table" for additional analytical results.
[c]See the "Additional VOCs Table" for additional analytical results.
ND Not detected.
J Estimated value, result is between the reporting limit and the method detection limit.

Table 9. BTEX Compounds Concentrations From Wells at the 4.5 Acre Site (reported in micrograms per liter)

Location	Benzene	Toluene	Ethylbenzene	Total Xylenes[a]	Total BTEX[b]
PIN20	**4.5 Acre Site**				
0502	<1	<1	<1	ND	ND
0503	<1	<1	<1	ND	ND
M001	<1	0.19J	<1	ND	ND
M002	<1	<1	<1	ND	ND
M003	<1	<1	<1	ND	ND
M004	<1	<1	<1	ND	ND
M005	<1	<1	<1	ND	ND
M006	<1	<1	<1	ND	ND
M007	<1	0.51J	<1	ND	ND
M009	<1	0.36J	<1	ND	ND
M011	<1	<1	<1	ND	ND
M012	<1	<1	<1	ND	ND
M013	1.5J	<5	<5	ND	ND
M015	<1	<1	<1	ND	ND
M017	<1	<1	<1	ND	ND
M018	<1	0.59J	<1	ND	ND
M019	<1	<1	<1	ND	ND
M021	<1	<1	<1	ND	ND
M022	<1	<1	<1	ND	ND
M023	<1	<1	<1	ND	ND
M024	<1	<1	<1	ND	ND
M025	<1	<1	<1	ND	ND
M028	<1	<1	<1	ND	ND
M035	<1	<1	<1	ND	ND
M036	<1	3.9	<1	ND	3.9
M044	<25	<25	<25	ND	ND
M048	<100	<100	<100	ND	ND
M049	<1	<1	<1	ND	ND
M050	<1	<1	<1	ND	ND
M051	<1	<1	<1	ND	ND
M052	<2.5	<2.5	<2.5	ND	ND
M18D	<1	<1	<1	ND	ND
M22D	<1	<1	<1	ND	ND
M38D	<1	<1	<1	ND	ND
M40D	<1	<1	<1	ND	ND
M40S	<1	<1	<1	ND	ND
M41D	<1	<1	<1	ND	ND
TE01	<1	<1	<1	ND	ND
TE04	<1	<1	<1	ND	ND
TE05	<1	<1	<1	ND	ND

[a]m-, o-, p- Xylene if detected.
[b]"J" values are not included in the "Total BTEX" value.
ND Not detected.
J Estimated value, result is between the reporting limit and the method detection

Table 10. BTEX Compounds Concentrations From DPT Locations at the 4.5 Acre Site (reported in micrograms per liter)

Location	Depth (ft bls)	Benzene	Toluene	Ethylbenzene	Total Xylenes[a]	Total BTEX[b]
PIN20		4.5 Acre Site				
DP01	18	<1	<1	<1	ND	ND
DP01	26	0.52J	0.21J	<1	ND	ND
DP02	18	<1	<1	<1	ND	ND
DP02	26	<250	<250	<250	ND	ND
DP03	18	<1	<1	<1	ND	ND
DP03	26	<1	0.25J	<1	ND	ND
DP04	26	0.48J	<1	<1	ND	ND
DP05	24	16	<1	<1	ND	16
DP06	18	6.7	<1	<1	ND	6.7
DP06	26	2.2J	<10	<10	ND	ND
DP07	18	<1	<1	<1	ND	ND
DP07	24.5	<50	<50	<50	ND	ND
DP08	18	<1	2.6	0.61J	0.71J	2.6
DP08	26	<250	<250	<250	ND	ND
DP09	26	<1	<1	<1	ND	ND
DP10	26	<1	<1	<1	ND	ND
DP11	18	11	<1	<1	ND	11
DP11	25	0.48J	<1	<1	ND	ND
DP12	18	<1	<1	<1	ND	ND
DP12	26	<2.5	<2.5	<2.5	ND	ND
DP13	18	<1	<1	<1	ND	ND
DP13	26	<1	<1	<1	ND	ND
DP14	18	0.71J	0.19J	<1	ND	ND
DP14	26	<1	0.2J	<1	ND	ND
DP15	18	0.27J	<1	<1	ND	ND
DP15	26	0.14J	0.34J	0.21J	0.13J	ND
DP16	23.5	<1	0.15J	<1	ND	ND
DP17	18	0.6J	<1	<1	ND	ND
DP17	26	<1	0.18J	<1	ND	ND
DP18	18	<1	<1	<1	ND	ND
DP18	26	0.17J	0.28J	0.26J	0.65J	ND
DP19	26	<1	0.22J	<1	ND	ND
DP20	18	<1	0.15J	<1	ND	ND
DP20	26	<1	<1	<1	ND	ND
DP21	18	<1	<1	<1	ND	ND
DP21	26	0.27J	<1	<1	ND	ND
DP22	26	0.27J	<1	<1	ND	ND
DP23	26	<1	<1	<1	ND	ND
DP24	18	<1	<1	<1	ND	ND
DP24	26	<1	<1	<1	ND	ND
DP25	18	0.26J	3.1	1.2	9.8	14.1

Table 10 (continued). BTEX Compounds Concentrations From DPT Locations at the 4.5 Acre Site (reported in micrograms per liter)

Location	Depth (ft bls)	Benzene	Toluene	Ethylbenzene	Total Xylenes[a]	Total BTEX[b]
DP25	26	<2.5	0.64J	<2.5	ND	ND
DP26	26	<1	<1	<1	ND	ND
DP27	26	<100	<100	<100	ND	ND
DP28	18	<1	<1	<1	ND	ND
DP28	26	<1	<1	<1	ND	ND
DP29	18	<1	<1	<1	ND	ND
DP29	26	<1	0.42J	<1	ND	ND

[a]m-, o-, p- Xylene if detected.
[b]"J" values are not included in the "Total BTEX" value.
ND Not detected.
J Estimated value, result is between the reporting limit and the method detection

Table 11. Additional VOCs Concentrations From Wells at the 4.5 Acre Site

Location	Chloromethane	MTBE	Tetrachloroethene
PIN20	**4.5 Acre Site**		
0503			0.16J
M002		10	
M007	0.2J		

J Estimated value, result is between the reporting limit and the method detection limit.

Table 12. Additional VOCs Concentrations From DPT Locations at the 4.5 Acre Site

Location	Depth (ft bls)	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	Carbon tetrachloride	Chloromethane	MTBE	Tetrachloro-ethene
PIN20		4.5 Acre Site					
DP01	26				0.24J		
DP11	18	0.39J			0.23J		
DP15	26	0.49J					
DP16	23.5	0.4J					
DP17	18	0.75J					
DP18	18					1.9J	
DP18	26	0.41J				1J	0.13J
DP20	18	0.72J	0.82J			0.93J	
DP29	26			0.46J			

J Estimated value, result is between the reporting limit and the method detection

Table 13. Summary of Geochemical Parameters Measured in 4.5 Acre Site Wells from July 2000 to April 2001

Parameter	Minimum Value	Maximum Value	Average Value
Dissolved Oxygen (mg/L)	0.07	11.91	1.98
Oxidation Reduction Potential (mV)	-215	329	-67
Specific Conductance (µS/cm)	175	5,280	1,336
Temperature (°C)	21.79	33.3	25.1
Turbidity (NTU)	0.5	1,502	321
pH	5.77	7.55	6.8

Table 14. Summary of Heterotrophic Plate Count (HPC) method results for selected 4.5 Acre Site wells from April 2001

Location	Depth (ft bls)	Heterotrophic Plate Count (CFU/1.0 ml)
DP06–N001	18–22	15
DP06–N002	26–30	280
DP07–N001	18–22	210
DP07–N002	24.5–28.5	340
DP08–N001	18–22	38
DP08–N002	26–30	170
DP24–N001	18–22	43
DP24–N002	26–30	160
DP25–N001	18–22	41
DP25–N002	26–30	270

Table 15. Results of Iron Analysis During April 2001 DPT Sampling

Sample ID	Depth bls (ft)	Total Iron (mg/L)	Ferrous Iron (mg/L)	Ferric Iron by Difference (mg/L)	Reduced (ferrous) iron as % of total
DP01–0001	18–22	4.40	1.20	3.20	27
DP01–0002	26–30	7.00	6.20	0.80	89
DP02–0001	18–22	32.40	27.00	5.40	83
DP02–0002	26–30	5.20	4.00	1.20	77
DP03–0001	18–22	11.40	10.80	0.60	95
DP03–0002	26–30	not analyzed for iron			
DP04–0001	26–30	2.51	2.42	0.09	96
DP05–0001	26–30	8.50	7.00	1.50	82
DP06–0001	18–22	10.35	9.35	1.00	90
DP06–0002	26–30	0.05	0.08	-0.03	100
DP07–0001	18–22	2.35	2.00	0.35	85
DP07–0002	24.5–28.5	6.30	5.60	0.70	89
DP08–0001	18–22	8.70	7.50	1.20	86
DP08–0002	26–30	2.24	2.14	0.10	96
DP09–0001	26–30	7.30	7.00	0.30	96
DP10–0001	26–30	2.23	2.22	0.01	100
DP11–0001	18–22	7.20	6.10	1.10	85
DP11–0002	25–29	6.10	5.00	1.10	82
DP12–0001	18–22	12.80	11.60	1.20	91
DP12–0002	26–30	2.88	2.82	0.06	98
DP13–0001	18–22	22.30	22.40	-0.10	100
DP13–0002	26–30	1.39	1.30	0.09	94
DP14–0001	18–22	6.90	6.10	0.80	88
DP14–0002	26–30	2.60	2.00	0.60	77
DP15–0001	18–22	6.30	5.00	1.30	79
DP15–0002	26–30	not analyzed for iron			
DP16–0001	23.5–27.5	5.60	5.00	0.60	89
DP17–0001	18–22	6.50	4.20	2.30	65
DP17–0002	26–30	2.50	2.00	0.50	80
DP18–0001	18–22	5.40	5.10	0.30	94
DP18–0002	26–30	1.87	1.84	0.03	98
DP19–0001	26–30	2.19	2.14	0.05	98
DP20–0001	18–22	4.40	4.20	0.20	95
DP20–0002	26–30	3.11	2.99	0.12	96
DP21–0001	18–22	12.10	10.80	1.30	89
DP21–0002	26–30	3.10	2.90	0.20	94
DP22–0001	26–30	1.74	1.73	0.01	99
DP23–0001	26–30	3.90	3.40	0.50	87
DP24–0001	18–22	9.40	9.00	0.40	96
DP24–0002	26–30	not analyzed for iron			
DP25–0001	18–22	26.50	25.80	0.70	97
DP25–0002	26–30	4.70	4.40	0.30	94
DP26–0001	26–30	2.76	2.66	0.10	96
DP27–0001	26–30	1.17	0.89	0.28	76
DP28–0001	18–22	5.20	3.10	2.10	60
DP28–0002	26–30	2.13	1.99	0.14	93
DP29–0001	18–22	5.20	3.40	1.80	65
DP29–0002	26–30	0.96	0.83	0.13	86

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Appendix A

Laboratory Reports—April 2001 Quarterly Results

Table A–1. Relative Percent Difference (RPD) for Duplicate Samples
4.5 Acre Site

Sample ID	Duplicate ID	Case Number	Constituent	S[a]	D[b]	RPD Value	5 times DL[c]	Fail[d]
PIN20–DP08 18 ft	PIN20–0550	B151360	1,1-Dichloroethene	0.15	0.18	18	5	
			Benzene	0.5	0.28	56	5	
			cis-1,2-Dichloroethene	1.1	0.8	32	5	
			Ethylbenzene	0.61	0.63	3	5	
			o-Xylene	0.71	0.75	5	5	
			Toluene	2.6	2.8	7	5	
			Trichloroethene	0.88	0.82	7	5	
			Vinyl chloride	9	7.7	16	5	
PIN20–DP11 25 ft	PIN20–0551	B151363	Benzene	0.48	0.5	4	5	
			Chloroethane	1	0.88	13	5	
			Chloromethane	0.5	0.3	50	5	
			Trichloroethene	0.17	0.5	99	5	
			Vinyl chloride	1.6	0.78	69	5	
PIN20–DP16 23.5 ft	PIN20–0552	B151361	1,1,2,2-Tetrachloroethane	0.4	0.5	22	5	
			Methylene chloride	2.4	2.5	4	25	
			Toluene	0.15	0.5	108	5	
			Vinyl chloride	0.5	1.5	100	5	
PIN20–DP20 18 ft	PIN20–0553	B151361 B151362	1,1,2,2-Tetrachloroethane	0.72	0.5	36	5	
			1,1,2-Trichloroethane	0.82	0.5	48	5	
			Propane, 2-methoxy-2-methyl-	0.93	5	137	50	
			Toluene	0.15	0.5	108	5	
			trans-1,2-Dichloroethene	0.5	0.32	44	5	
			Vinyl chloride	0.5	1.2	82	5	
PIN20–DP28 26 ft	PIN20–0554	B151362	cis-1,2-Dichloroethene	0.5	0.12	123	5	
			Methylene chloride	0.32	2.5	155	25	
			Vinyl chloride	0.32	0.33	3	5	
PIN20–M002	PIN20–0552	B151176 B151176A	Propane, 2-methoxy-2-methyl-	10	5	67	50	
PIN20–M028	PIN20–0551	B151128	Methylene chloride	0.39	1.9	132	25	
PIN20–TE03	PIN20–0553	B151177 B15177A	nondetect					
PIN20–TE05	PIN20–0550	B151116	Methylene chloride	0.94	0.62	41	25	

[a]S = Original sample (N001), VOC concentration in mg/L.
[b]D = Duplicate sample (N002), VOC concentration in mg/L.
[c]DL = Detected limit.
[d]Fail is an RPD greater than "30% and more than 5 times the detection limit. F=fail.

End of current text